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ABSTRACT

The major aim of this study was to obtain a measure of the relative teaching effectiveness of television instruction as compared to regular instruction, utilizing as subject matter parts of the Army basic training program. The study was not designed to reorganize the curriculum for television, nor was it designed to maximize the television presentation. The same instructors taught the courses to both the experimental and control groups. The groups were matched for intelligence on the basis of the Army Area I scores. The use of kinescope recordings as a review method was also explored. The results of the study indicate that television instruction was at least as effective as regular instruction and was especially effective for lower-aptitude groups. When kinescope recordings were used for review purposes following initial instruction, test performances were significantly higher, especially in the low-aptitude groups. These results suggest that the two possible applications for television contemplated by the Army, mass training during emergency situations and routine training at Army Schools and installations, could be carried out without a loss in learning effectiveness. The appendices contain information relating to research methodology. (JY)

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Technical Report 14

TELEVISION IN ARMY TRAINING:

Evaluation of Television in Army Basic Training

by

Joseph H. Kanner, Richard P. Runyon and Otello Desiderato

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TELEVISION IN ARMY TRAINING:
EVALUATION OF TELEVISION IN ARMY BASIC TRAINING

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BRIEF

The purpose of this study was to obtain basic information on the comparative teaching effectiveness of television and the Army's regular basic training instruction. This information would have implications for two possible applications of television contemplated by the Army: (1) mass training during emergency situations including conditions of full mobilization; (2) routine training at Army schools and installations.

The procedures employed were: (1) selecting 14 hours of instruction representative of the information and skills taught in the first eight weeks of Army basic training; (2) preparing parallel television instruction, duplicating the content, sequence, and training procedures of the 14 selected regular hours; (3) equating for instructor differences by using the same instructor for television and regular instruction; (4) training groups of basic trainees, matched for Area I scores, by television and regular instruction; (5) administering achievement tests immediately after and approximately one month after both television and regular instruction.

The relative teaching effectiveness of kinescope recordings and regular instruction was also compared. In addition, the effects of a technique employing kinescope recordings for review purposes were evaluated. The experimental design permitted separate analysis of the effects of these instructional methods for high- and low-aptitude trainees.

The results of the study may be summarized as follows:

(1) The basic comparisons between television and regular instruction under matched conditions indicated:

- (a) Television instruction was at least as effective as regular instruction.
- (b) Television instruction was more effective for lower-aptitude groups.
- (c) Television instruction was remembered at least as well as regular instruction.

(2) The comparisons between kinescopes and regular instruction under matched conditions indicated that kinescope instruction was as effective as regular instruction.

(3) When kinescopes were used for review purposes following initial instruction:

- (a) Test performance for groups receiving one kinescope review was significantly higher than scores obtained immediately after initial instruction.
- (b) The test scores of low-aptitude trainees receiving the one kinescope review approached those of high-aptitude groups following initial instruction.

These results suggest that, should conditions require the Army to adopt a mass medium of instruction such as television, instruction of the types used in this study could be presented by television with the strong assurance that there would be no loss in learning effectiveness.

PREFACE

This study resulted from an original request by the Office, Chief of Army Field Forces, dated 15 June 1953.[1] The request specified: "While there is limited evidence that television is a successful training medium, such evidence is not sufficient to justify the mass application of the medium in the Army without further practical test and trial . . . Emphasis should be given to . . . 'evaluation of learning' with special attention to learning in television instruction compared with learning under matched conditions of usual instruction techniques."

The Army request also indicated a need for pursuing and evaluating some of the recommendations contained in a previous Army-sponsored television study.[2] This exploratory study recommended that future television studies be directed toward objectives with:

"A.—FIRST PRIORITY to yield an indication as to whether television can result in an economy of time, money or personnel by

1. Effective utilization of television in present training schedule, including the
   a. Evaluation of learning
   b. Development of television production methods most useful for training
   c. Determination of skills television instructors should have and the best way to develop them in present training personnel."

Following a planning conference on 13 August 1953, the Human Resources Research Office was designated as the responsible agency for the evaluation study.[3]

[1]Letter from Office, Chief of Army Field Forces to Assistant Chief of Staff, G-3, dated 15 June 1953, Subject: Evaluation of Television in Mass Training, ATTNG-83/186-7 413.4.

[2]Fritz, Martin F. *et al.*, *Survey of Television Utilization in Army Training* (Human Engineering Report SpecDevCen 530-01-1). Prepared for Army Participation Group of the Special Devices Center by Iowa State College, Ames, Iowa (Contractor), 31 December 1952.

[3]Letter from Office, Chief of Army Field Forces, to Assistant Chief of Staff, G-3, dated 19 August 1953, Subject: Evaluation of Television in Mass Training, ATTNG-83/270-4 413.4; Letter from Assistant Chief of Staff, G-1, to Associate Director (Army), Navy Special Devices Center, dated 21 August 1953, Subject: Evaluation of Television in Mass Training, G1 353 (14 Jan 53).

TELEVISION IN ARMY TRAINING:

EVALUATION OF TELEVISION IN ARMY BASIC TRAINING

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TELEVISION IN ARMY TRAINING:
EVALUATION OF TELEVISION IN ARMY BASIC TRAINING

Chapter 1

SCOPE OF THE RESEARCH

PURPOSE OF THE STUDY

The major aim of the present study was to obtain a measure of the relative teaching effectiveness of television instruction as compared to regular instruction, utilizing Army basic training subject matters. In this comparison, current teaching procedures, subject-matter content, and sequence were not altered. The study was not designed to change or reorganize regular Army instruction for television purposes, or to systematically pursue factors leading to the most effective television presentation.[1]

GENERAL APPROACH

The Army research request reflected two major uses contemplated for television:

(1) Instruction during emergency periods and under conditions of full mobilization. In such periods, it was anticipated that time limitations, shortages of qualified instructors, and the absence of regular instructional facilities could be overcome by the employment of a mass training medium such as television.

(2) Instruction in the various subject matters routinely taught to Army personnel at various schools and installations.

To obtain information bearing upon these contemplated uses for television, the following comparisons were made in the present study:

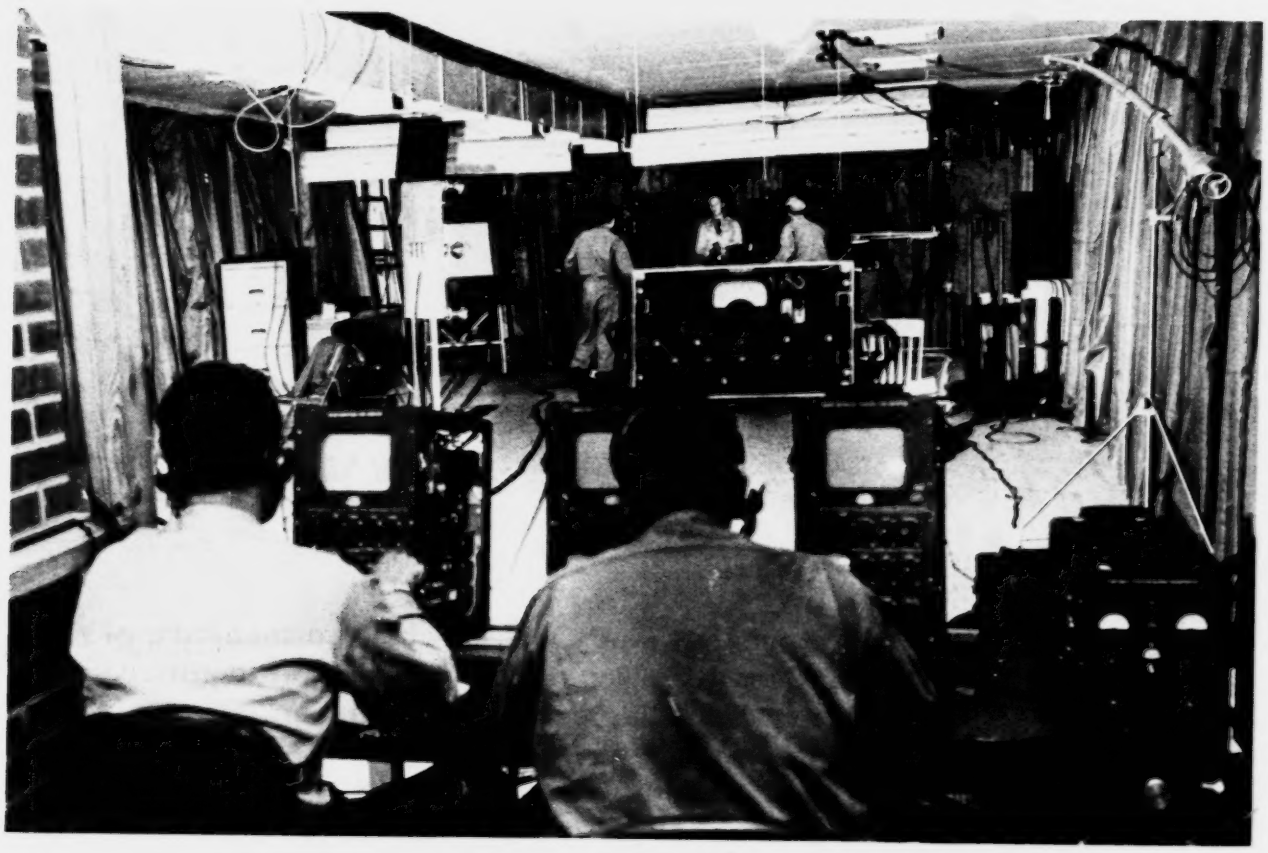
(1) Between television and regular instruction for 14 selected hours of basic training instruction

(2) Between kinescope recordings[2] and regular instruction

(3) Between the relative retention effects of television and regular instruction

[1]Some of the leads obtained in the present study on the production of effective television instruction are currently being investigated at Camp Gordon.

[2]Film duplicates of live television instruction.



U. S. Army Photograph

Camp Gordon Closed-Circuit Facilities

Figure 1

(4) Between low- and high-aptitude trainees on the immediate learning and retention effects of television and regular instruction

(5) Between retention without further training and with kinescope review, for low- and high-aptitude trainees

In making these comparisons, there was opportunity for obtaining information bearing upon (1) the effectiveness and feasibility of using television as a mass communications medium, (2) qualifications and training of instructors and technical personnel for television instruction, (3) procedural patterns for adapting current training methods to television requirements, (4) techniques for producing the most effective television instructional presentations, (5) research techniques pointing to economies in future research, and (6) trainee reactions to television instruction.

DESIGN OF THE RESEARCH

The comparisons made in this study utilized subject matters from the first eight weeks of Army basic training. For the primary comparison between television and regular instruction, 14 representative hours of basic training instruction were selected. These 14 hours occurred in their normally scheduled position in the regular eight-week basic training

cycle. A number of these 14 hours were also utilized in making other secondary comparisons. Later chapters specify the particular hours of instruction employed for various comparisons.

Basic training companies provided the trainees used for the various comparisons made in this study. The men were matched for aptitude by splitting each company into two equal sections on the basis of Area I scores. One half received television instruction for the 14 hours of basic training selected; the other half received regular instruction in these same hours. For the basic comparison between television and regular instruction, two companies, labeled primary companies, were split in this manner. In order to equalize for influence of instructors, the same instructor gave television instruction to one half-company and later gave regular instruction to another half-company.

Immediately after instruction by both methods had been completed, achievement tests were administered to the trainees. In addition, one month later retention tests were administered to the same trainees in certain of the subject matters. Fifteen paper-and-pencil tests and two performance tests were constructed and used. In addition, a trainee-reaction questionnaire was administered following the achievement test.

Other comparisons were made between kinescope recordings and regular instruction. Basic training companies were also used for these comparisons and were split into half-companies and matched for aptitude

U. S. Army Photograph

Signal Corps Mobile Television Unit: Equipment and Personnel

Figure 2

on the basis of Area I scores. These companies, labeled standby companies, were also used to replace a primary company if it were lost for a particular hour of instruction, to try out new tests, and to obtain pretest and similar types of information.

The comparisons and measurements made in the study are indicated in Table 1.

Table 1

COMPARISONS AND MEASUREMENTS MADE

Comparison	Test Measurement		
	Immediate	Retention	Review
TV vs. regular instruction	X	X	
Kinescope vs. regular instruction	X	X	X

LOCATION AND TESTING FACILITIES

The investigation was carried out at Camp Gordon, Ga., during the fall of 1953. This installation was selected because it had in operation a complete closed-circuit television facility (see Figure 1[1]). In addition, this camp conducted a basic training program which could serve as a source of subject matters, instructors, and trainees. The Signal Corps Mobile Television Unit was moved to this installation and cooperated in the research, supplying both technical facilities and personnel (see Figure 2).

Two buildings were designated to meet the training and testing requirements of the study. One building which had previously been used for regular instruction was used for the same purpose during the study. It had adequate seating capacity and teaching facilities for presenting regular instruction (see Figure 3). The other building was a converted theater in which nine cubicles, separated by plywood walls, were constructed. Each cubicle could seat up to 25 trainees, although in practice only about 12 to 16 men were assigned to one compartment. A 21-inch television receiver was mounted in the center of the front wall of each cubicle so that the screen picture could be adequately observed by any of the trainees in any part of the cubicle (see Figure 4).

Under the supervision of HumRRO personnel, a number of enlisted men served as proctors, distributed and collected test papers, and performed similar duties in both buildings. When trainees arrived, the proctors supervised their seating; in the regular instruction building the trainees were seated in alternate rows, while in the television

[1]Photographs used in this report are the work of the Army Pictorial Service Division, Office of the Chief Signal Officer, Department of the Army.

building equal numbers of trainees were assigned to each of the television-receiver cubicles.

When a company was scheduled to receive television or regular instruction at a particular day and hour, the company commander was informed. On the basis of rosters provided to him, the commander divided the company so that half would go to the regular instruction building and the other half to the television instruction building. When needed, transportation was provided to bring the troops to the two buildings. In practice, these procedures worked very smoothly with few instances of confusion.

STATISTICAL PROCEDURES

This report presents a minimum of statistical details and procedures. It should be stated that the results reported herein are based on such statistical methods as analysis of variance, t tests, and chi-square. Results are described as "significant" when differences found would occur by chance less than five times in one hundred.

Regular Instruction Site

Figure 3

Television Instruction Site

Figure 4

U. S. Army Photographs

SUMMARY OF ACTIVITIES

Military considerations limited the major data-gathering portion of the study to a period of approximately two months during the fall of 1953. During this interval, the following activities—which included the necessary preliminary and pilot testing and experimentation—were carried out:

(1) Eighty-four hours of television instruction were constructed and presented.

(2) Fifteen written and two performance tests and a trainee-reaction questionnaire were constructed.

(3) Approximately 45,000 tests were administered and scored.

(4) Forty-three basic training companies were utilized in 103 training and testing situations.

(5) About 12,000 basic trainees were trained and tested under the terms of the research.

Chapter 2

TRAINING AND TESTING OF EXPERIMENTAL COMPANIES

The experimental procedures employed in this study are discussed in detail in this chapter. More specifically it will consider the following: (1) selection and treatment of basic training companies, (2) selection of Army basic training subject matters, (3) construction, administration, and scoring of tests, and (4) preparation and administration of television and regular instruction hours.

SELECTION AND TREATMENT OF BASIC TRAINING COMPANIES

Basic training companies provided the trainees used in this study. Every week new trainees, from various reception centers, arrived at Camp Gordon. These trainees were immediately formed into two companies for eight weeks.[1] The present study used a number of these companies, both to accomplish the primary aims of the study and to obtain information on certain secondary objectives.

Composition of Basic Training Companies

Previous experience indicated the necessity for controlling the composition of these companies for such factors as aptitude and geographic origin. Unless controlled, these factors could interfere strongly with attempts, such as the present study was making, to determine the effects which different instructional methods would have upon learning. Therefore, it seemed necessary to make up the experimental and control groups so that they were highly similar, that is, matched as closely as possible with respect to these factors.

[1]Halfway through this study, an administrative change at Camp Gordon resulted in three basic training companies being formed each week. This change did not affect the conduct of the study, since the two companies used for the basic comparison had already been selected.

In practice it was found that, for the companies selected for the comparisons in this study, the majority of trainees came predominantly from one reception center. Thus, out of about 500 men usually available, only a handful came from other than one reception center. It therefore was not deemed important to use geographical origin as a factor in equating the companies.

The companies were equated for aptitude on the basis of Army Area I scores, which are assumed to be highly correlated with other intelligence measures. The scores were used to assign trainees to experimental (television or kinescope instruction) or control (regular instruction) groups.

The procedure employed for obtaining four platoons similar in aptitude for each company was as follows: (1) upon arrival at Camp Gordon, the trainees were temporarily assigned to a company; (2) the Area I scores for these trainees were obtained and ranked in ascending order; (3) using successive blocks of four men, trainees were randomly assigned to one of four platoons.

Underlying this equating procedure was the objective of obtaining four platoons within each company which were identical or highly similar with respect to Area I scores. Checks upon the procedure indicated that no more than a fraction of a point separated the four platoons which were matched or equated in this manner. All basic training companies entering or in training at Camp Gordon during the period of this study were thus equated.

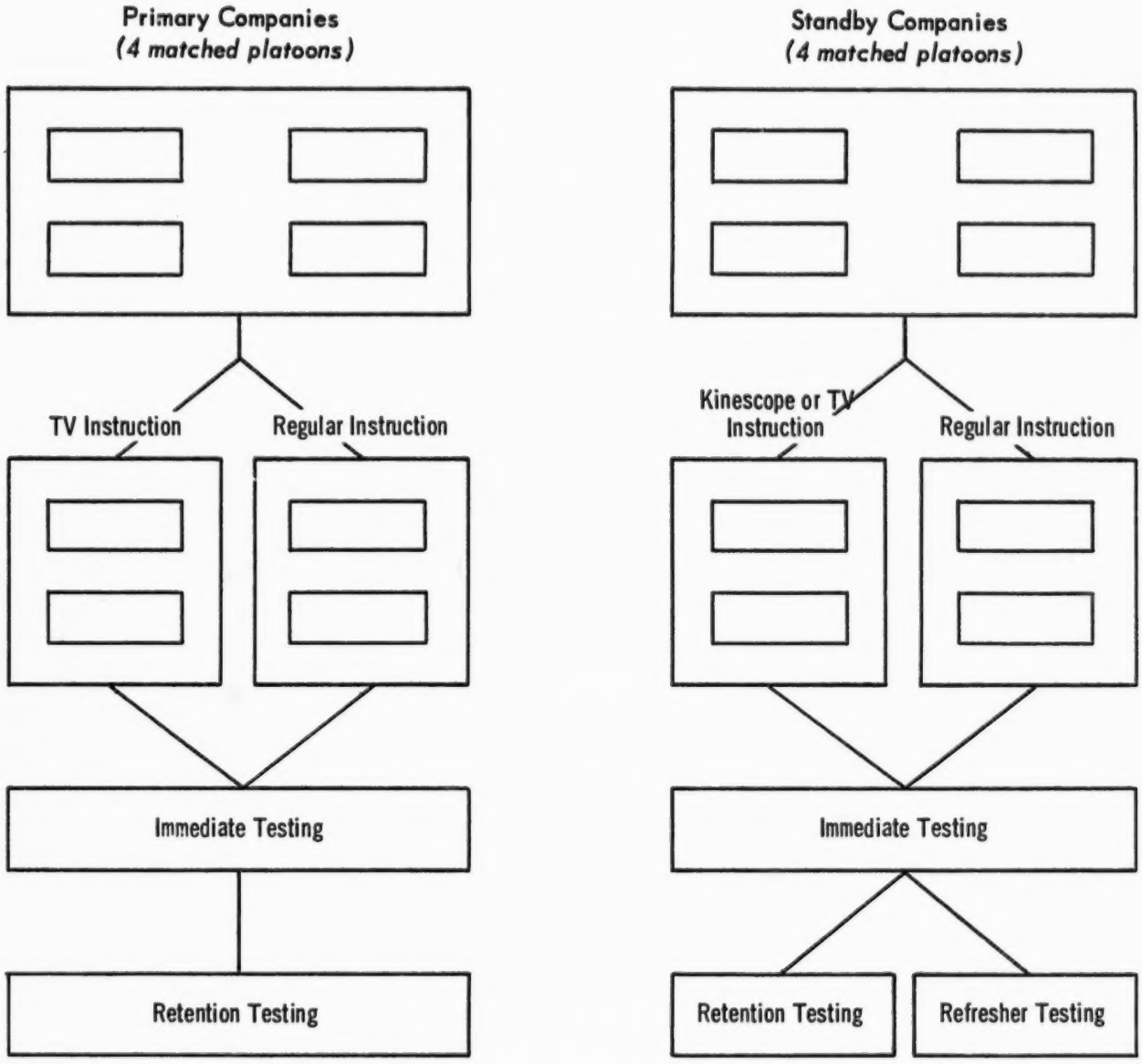
Primary Companies

Two companies, which began their basic training during the same week, were selected to carry out the main objectives of the study. Each of these companies, referred to as "primary" companies, contained about 200 basic trainees. When used for the main objective, the comparison between television and regular instruction, the primary company was split into two halves, each half containing two matched platoons. One half of the primary company always received television instruction (experimental group); the other half always received regular instruction (control group). Figure 5 indicates how a basic training company was divided in order to make the basic comparisons.

Standby or Secondary Companies

Other basic training companies available at Camp Gordon were designated as "standby" or secondary companies. One of the major uses planned for the standby company was as a substitute for one of the primary companies in the event of such problems as administrative errors or equipment breakdowns. In practice, this substitution occurred twice, in Signal Communications and Light Machine Gun subject matters. The standby companies were also used to make various comparisons between kinescope and regular instruction (see Figure 5), to obtain pretest information, and to try out new tests and procedures.

COMPARISONS, TESTS, AND DIVISION OF EXPERIMENTAL COMPANIES



NOTE: See text for description of the two types of companies.

Figure 5

Briefing and Scheduling of the Companies

Some concern was felt that television-trained groups might be more motivated than the regular instruction groups because they were receiving a novel or different mode of training. In an attempt to reduce or equalize any possible motivational differences, all trainees were informed that they were participating in an important study. In addition, distinctive helmet insignia were issued to both the television and regular instruction groups.[1]

[1]See Appendix A for discussion of "novelty" or motivation aspects of television training.

In cooperation with Camp Gordon personnel, a detailed schedule was worked out to indicate the day and hour each of the two primary companies would be available for training and testing for each of the subject matters selected for use in this study.

SELECTION OF ARMY BASIC TRAINING SUBJECT MATTER

Designation of Subject Matters

The original Army research request specified that the investigation utilize subject matters found in the first eight weeks of Army basic training. This area of Army instruction seemed particularly appropriate because:

(1) Basic training represents one of the largest Army investments in training time and effort

(2) The large number of men undergoing this training would provide an adequate number of trainees

(3) The wide range of skills and information found in basic training subject matters would permit an adequate sampling for testing the effectiveness of the two instructional methods

(4) The availability of trained instructors and training materials would lead to economies in time and training

Selection of Army Basic Training Subject Matters

A number of criteria governed the selection of the subject matters to be used in this study. Selection was confined to those subjects taught in the first eight weeks of the basic training cycle, as contained in the master training schedule prepared by the Office, Chief of Army Field Forces. Preliminary evaluation of the available Army Training Program (ATP) subject matters indicated that many would not be suitable because of difficulty in constructing suitable tests in the time available. For this and other reasons, subject matters such as Mail Orientation, Character Guidance, Adaptation and Group Living, and Creeping and Crawling were eliminated from consideration. When such subjects were excluded, 136 hours of instruction remained to be considered.

The original intention was to select suitable subject matters by employing the check list described in the Human Engineering Report.[1] It was found, however, that other considerations outweighed sole reliance on this check list. These considerations were: (1) the relatively brief period of time available for preliminary preparation prior to the starting date for the study; (2) the feasibility of constructing suitable tests for each of the subject matters within the time available; (3) judgments as to the suitability of certain subject matters, based on the experiences of

[1]Fritz, *et al.*, *op. cit.*, p. 24.

HumRRO and Camp Gordon personnel; (4) administrative problems such as scheduling difficulties, TV equipment needs, movement of troops, and availability of training aids.

Although the selection of the subject matters was governed largely by these considerations, the check lists nevertheless were distributed to a number of instructors at Camp Gordon. The results suggested that the subject matters chosen were with three exceptions deemed suitable as measured by the check list procedure.[1]

In light of the limitations cited, and the objective of obtaining subject matters which were representative or typical of the skills and information taught in the first eight weeks of the basic training cycle, eight subjects (containing 14 hours of instruction) were selected for use in the present study. These subjects constituted about 10 per cent of the relevant available 136 hours and were representative of a number of different kinds of basic training instruction. Table 2 lists these eight subjects as well as the ATP hour and the training week in which each subject matter is scheduled. It will be noted that the Map Reading subject matter is heavily represented in the selection; these hours were chosen because they contained a great variety of skills and information not covered in other subject matters. Teaching of the subject matters selected was scattered from the first through the seventh week of basic training.

Table 2

SUBJECT MATTERS SELECTED

Subject	ATP Hours[a]	Number of Hours of Subject Matter Instruction	Training Week[b]
M1 Functioning	5	1	1
Signal Communications	1	1	1
Military Justice	2	1	1
Mines and Booby Traps	1	1	3
Map Reading	1,2,3,4,6,7,8	7	4,5
Squad Tactics	3	1	5
Defense Against Air and Armor	2	1	6
Light Machine Gun	1	1	7
Total		14	

[a]The specific hour of instruction for each subject matter included in the present study. For example only the third hour of the 20 hours on squad tactics was used; the specific seven hours of 12 allotted to map instruction are indicated as hours 1,2,3,4,6,7,8.

[b]Week in the eight-week basic training program in which these subject matters are taught.

[1]The check list indicated that the performance aspects of Map Reading, Hours 2 and 7, and disassembly of the Light Machine Gun were not adaptive to TV instruction. Later results indicated that TV instruction was particularly effective for these hours.

CONSTRUCTION, ADMINISTRATION, AND SCORING OF TESTS

Test Construction

The requirements of the study called for the testing of trainees at the end of each hour of instruction as well as retesting approximately one month after instruction. These procedures required the construction of tests for each of the selected subject matters. No such tests were in existence at Camp Gordon, since it is not Army policy to give tests for individual hours of training.

Ordinarily, the construction of tests to measure the learning of these hours of instruction would constitute a separate study and require considerable time. In this instance, however, only about three weeks were available for this activity. During this time attempts were also made to "pretest" each test after its construction.

In constructing these tests, use was made of Army lesson plans, which outline the content and objectives for basic training and instruction. These lesson plans were examined and questions formulated covering the skills and information contained in each section. Other questions called for combining information from various sections of the lesson plan. When placed in test form, questions were not in the same serial order as the sections of the lesson plan which they covered.

Seventeen tests were constructed for the 14 hours of subject matter content used. The Signal Communications subject matter was split into two written tests, one on the phonetic alphabet and the other on military time. For Map Reading, Hour 7, and the Light Machine Gun subject matters, both written and performance tests were constructed. For Map Reading, Hour 7, the performance test required the trainees to orient a map and a compass, while for the Light Machine Gun hour the trainees were timed in their ability to disassemble the weapon. In addition to written items, the test for Map Reading, Hour 2, contained performance-type items, which required the trainees to measure distances between points on a scaled map. The 14 written tests were made up of multiple-choice and fill-in questions and picture identification items. Each item contained from 15 to 25 items.

When initial forms of tests were completed, they were tried out with standby companies whenever possible. On the basis of standby company performance, the tests were then revised, and appropriate time limits established. In some instances, a revised test was further pretested with a standby company before a final acceptable form was arrived at.

Immediate Testing

Trainees were tested immediately after each hour of instruction. Experience with standby companies indicated that about 15 minutes would be sufficient time for the majority of trainees to complete the written

tests. This was the time interval set up for the actual testing and, in practice, it proved to be adequate. A standard set of directions was prepared for use by the regular and TV instructors who actually administered the tests. As a result, only a few questions arose concerning the mechanics of completing the tests. Proctors were used and alternate seating was employed wherever possible, to reduce cheating.

Retention Testing

In addition to being tested immediately, the trainees were tested approximately one month after their initial instruction, the same tests being used. These retention tests were administered either to obtain a measure of trainee forgetting over a period of time, or to evaluate the learning effects of a kinescope review procedure.

The retention tests were administered in two ways. (1) Trainees in the two primary companies were called back approximately one month after their initial (TV or regular) training and testing. They had received no additional formal training during the interval for the subject matters tested. A written test was administered to the trainees. (2) Trainees in selected standby companies were called back about a month after their initial training and testing. Half the trainees were given a written test without any additional training, the other half were first given a single kinescope review and then a written test.

Pretesting

A previous section referred to the procedure of pretesting the preliminary test forms before arriving at the final test forms. In this section, "pretesting" refers to the procedure of measuring the information trainees possessed before receiving either television or regular instruction. This procedure is necessary to give a more accurate picture of the amount the men learn under the two methods of instruction.[1]

One possible pretesting procedure would have been to pretest the control and the experimental groups given television and regular instruction. However, limitations in testing time, plus evidence from other studies suggesting that pretest procedures influence learning, led to the pretest procedure finally adopted. A standby company was selected and matched so that it closely resembled the two primary companies in Area I scores. This company was taking its basic training about the same time and in the same sequence as the two primary companies. Before receiving regular training for any of the 14 hours of instruction used in this study, this standby company was given a pretest to determine the amount of information possessed by its trainees. This

[1]Appendix B lists these pretest scores and discusses certain implications drawn from them.

procedure was followed for all subject matters except Light Machine Gun disassembly.

Trainee-Reaction Questionnaire

A questionnaire was constructed to obtain information from the trainees on their reactions to the television and regular instruction received. The questionnaire was administered after the achievement test had been completed. It contained such items as: "Did you think the instructor spoke too fast for you to follow?" Most of the 18 questions required answers of a yes-no variety, a few were fill-in questions. The responses to the questionnaire from the various companies were tabulated. The information proved of great value in assessing the teaching effectiveness of a particular hour of instruction and, in addition, provided many hints as to weak spots needing correction, more emphasis, more coverage, or other changes. This information was also used in planning succeeding instructional presentations.[1]

Test Scoring

In the two-month period in which the data-gathering portion of the study was carried out, an estimated 45,000 achievement tests and 10,000 questionnaires were administered and scored. The imposing task of adequately scoring such a large number of tests was facilitated by Camp Gordon authorities who provided 10 to 15 enlisted men. Under the supervision of HumRRO personnel, these men were taught to score the various tests. The scoring task was greatly simplified by the fact that tests were mainly of an objective or short-answer type. All tests were completely scored at least twice, and in many instances three times. Rigid checks were made upon the accuracy of this scoring by cross-checking large samples. In practice, this procedure revealed an insignificant number of errors. Figure 6 illustrates the scoring facilities and supervised activities of these enlisted personnel at Camp Gordon.

U. S. Army Photograph

Administrative and Scoring Activities at Camp Gordon

Figure 6

[1]Appendix C contains a copy of this questionnaire and details about its use.

PREPARATION AND ADMINISTRATION OF TELEVISION AND REGULAR INSTRUCTION HOURS

Basic Approach

In keeping with the requirements of the original research request, the basic approach in preparing television presentations was to duplicate as closely as possible the content, sequence, and materials ordinarily used in regular instruction. Changes made in the lecture-demonstration instructional methods in use at Camp Gordon were held to a minimum. It was not the study's objective to investigate the factors which are related to the most effective television presentation. Therefore, no attempt was made to tailor the subject-matter content to meet the requirements of the most effective television presentation. The verbal material presented by the instructor remained constant in both the television and regular instruction situations. In this connection, written records of this material, prepared by the instructors, were used.

This approach was not interpreted to preclude the use of certain advantages inherent in the television medium itself, or the employment of readily constructible and inexpensive training aids for the television presentation. For example, the television camera makes possible such presentation devices as close-ups and superimposures. Use of these and other presentation techniques was sanctioned in the belief that it would be unrealistic to evaluate television instruction without them.

Instructors

For each of the 14 hours of instruction two experienced instructors, rated superior by the Camp Gordon instructional committee, were used. Most of these instructors had experience in teaching these hours for a period of at least six months. Each instructor taught both television and regular instruction hours in an effort to equalize possible instructor differences.[1]

Training Aids

Hand-written or rapidly lettered charts, a vuegraph, and other simple, inexpensive training aids were employed in the television presentations. Very often, in practice, the television training aids were simpler or less expensive than those employed in the regular instruction of the same subject matter. For example, in the regular instruction for Light Machine Gun disassembly three expensive eight-foot mockups were used, while in the television presentation a standard machine gun served the purpose.

[1]Appendix D describes the various problems encountered in training instructors for the television presentations, and the techniques and production procedures employed. Appendix E describes use of participation procedures in the television instruction.

Production Procedures

As the instructor went through his lecture or demonstrations, his material was checked against the various requirements found in the lesson plans for that subject matter.[1] Where material that was prescribed by the lesson plan was omitted, or where deviations in lesson-plan time allotments were found, corrections were made for both the television and regular instruction sessions. After these changes, the instructor again went through his teaching procedure, this time for the purpose of determining how available training aids could best be used. Corrections and suggestions were also made with respect to such points as the instructor's rate of speech and movements before the camera. A final rehearsal was held in which the effect of all these changes and recommendations was evaluated and coordinated by HumRRO and Signal Corps personnel.

Wherever possible, any changes in the television presentation were incorporated in the regular instruction. The procedure of having each instructor give both television and regular instruction at various times aided in transferring these changes. For example, any recommendations made to the instructor—such as change in rate of speech or better coverage of a particular point—for the television presentations were also applied by him when he gave his regular presentation. Observation of the instructor during regular instruction periods confirmed that this transfer of training did take place. It was the opinion of the instructional personnel at Camp Gordon that one of the incidental results of the preparation for television instruction was a marked improvement in the teaching effectiveness of the instructor in situations outside the present study.

Administration of Television and Regular Instruction Hours

For any particular instructional hour for a basic training company, television and regular instruction were presented simultaneously at the two special instructional sites. One instructor gave the regular instruction; another gave the television instruction from a studio. These instructors were reversed when the next company was trained for the same subject-matter hour. As previously described, the basic training company would be scheduled to appear at these sites for instruction. One half of the matched company proceeded to the television reception site, the other half to the regular instruction site.

One of the effects of splitting a basic training company in this manner was to halve the number of trainees normally receiving regular instruction. Under ordinary training routine a full company would receive regular instruction as a unit; as a result a large number of men would be seated in the rear where they could not see or hear instruction as well as

[1]See Appendix D.

those seated up front. Normal conditions thus would not be duplicated if the reduced number of trainees in the half-company were all seated up front. Therefore, trainees receiving regular instruction were seated in alternate rows so as to approximate usual seating conditions.

Simultaneous Instruction by One Instructor

Eleven of the 14 hours of instruction were presented in the manner described. However, for three of the hours—Map Reading, Hours 6, 7, and 8—a different procedure was used. These three hours were normally taught at a large outdoor site rather than within a formal classroom. It was decided to use these three hours to evaluate a procedure in which regular instruction was presented in the usual outdoor site and, through the use of Mobile Television equipment,[1] simultaneously transmitted to the television reception site. Under this procedure, therefore, the same instructor simultaneously gave regular and television instruction to a basic training company.

Supervision of Instruction

During both the television and regular instruction periods, HumRRO personnel were present. They made notes covering the following points: (1) whether the instructor, in his presentation, covered the lesson plan sections and information necessary to answer the tests; (2) qualitative opinions as to the teaching effectiveness of a particular instructor (i.e., whether he was ill at ease, nervous, etc.); (3) lighting, seating, and other factors which might influence trainee reactions to the instruction they were receiving. Some of this information was later used in scoring the tests. For example, where an instructor, in either the regular or television presentation, omitted information necessary for answering any items, these items were eliminated in the scoring of tests taken by both instruction groups. Where such elimination became excessive—that is, where more than two or three items were omitted by the instructor in either the live or television presentations—the entire instruction was repeated with another company. This occurred, it should be noted, only with standby companies. Changes were also made where necessary with respect to such elements as lighting and seating.

[1]See Figure 2.

Chapter 3

COMPARISON OF TELEVISION AND REGULAR INSTRUCTION UNDER MATCHED CONDITIONS

SUMMARY OF RESULTS

The basic comparisons between television and regular instruction under matched conditions indicated:

(1) Television instruction was at least as effective as regular instruction.

(2) Television instruction was more effective for lower-aptitude groups.

(3) Television instruction was remembered at least as well as regular instruction.

LEARNING AFTER ORIGINAL INSTRUCTION

Television instruction was at least as effective as regular instruction

It will be recalled that the principal comparison made in this study was based on two primary companies, each of which was split into two halves according to Area I scores. One half always received television instruction for the 14 hours of basic training selected, the other half received regular instruction in the same hours, and the influence of instructors was balanced. Seventeen tests were administered to measure learning in the 14 hours of instruction.

Table 3 presents the mean test scores made by the trainees immediately after receiving television or regular instruction in 14 basic training subject matters and the maximum possible score in the tests. The last column indicates whether the differences between the two methods of instruction were statistically significant.[1]

[1]It will be recalled that a difference is considered significant when it would occur by chance less than 5 times in 100.

Table 3

LEARNING AFTER ORIGINAL TELEVISION OR REGULAR INSTRUCTION

(Two Primary Companies; 17 Tests for 14 Hours of Instruction)

Subject Matter	Maximum Possible Score	Mean Score		TV Compared to Regular Instruction
		TV Instruction	Regular Instruction	
M1 Functioning	15	9.940	9.148	Significant[a]
Signal Communications				
Phonetic Alphabet	52	44.224	40.507	Significant
Military Time	10	6.901	6.342	Not significant
Military Justice	18	9.489	9.348	Not significant
Mines and Booby Traps	18	6.087	6.136	Not significant
Map Reading				
Hour 1	13	7.220	6.823	Not significant
Hour 2	13	7.616	6.933	Significant[a]
Hour 3	13	6.165	5.902	Not significant
Hour 4	12	7.122	6.811	Not significant
Hour 6	19	8.551	9.000	Not significant
Hour 7				
Written test	8	4.601	4.905	Not significant
Performance test	5	2.882	2.521	Significant
Hour 8	15	5.253	5.258	Not significant
Squad Tactics	16	12.538	11.897	Not significant
Defense Against Air and Armor	17	11.063	10.131	Not significant
Light Machine Gun				
Written test	23	13.699	13.849	Not significant
Performance test	280[b]	133.056[b]	178.399[b]	Significant

[a]While television instruction was statistically superior to regular instruction in these comparisons, statistical analysis indicated that this superiority may be attributed in part to the fact that the instructor, for reasons unknown, was more effective with the television group than with the regular instruction group. This occurred despite the fact that he had at least six months of regular instruction experience. The experimental design employed in this study permitted this type of analysis for all subject matters, but only for the two subject matters indicated in the table was this finding present.

[b]This is a time score in seconds. The lower the score the better the performance in disassembling the LMG.

Examination of Table 3 reveals that in 12 comparisons between television and regular instruction there is no significant difference between them.[1] In the remaining five comparisons, television instruction was found to be significantly superior to regular instruction. However, in two instances, there is evidence that this superiority may have been partially due to the fact that the instructor, for no obvious reasons,

[1]Without considering significance of differences between individual mean scores, it is of some interest that in 12 of the 17 comparisons the TV mean scores were higher than regular instruction mean scores.

appeared to be more effective with the television group than with the regular instruction group.

These results were obtained in a situation where controls were kept on subject-matter content, instructors, and intelligence of the trainees receiving both forms of instruction. No attempt was made to tailor or modify content, sequence of material, or other factors used in regular instruction to meet the particular needs of television instruction. Despite these restrictions on the development of television presentation, it was at least equal in teaching effectiveness of regular instruction.

These results point to the following conclusion: In an emergency situation, instruction in the types of subject matter used in this study could be presented by television with the assurance that there would be no loss in learning effectiveness.[1]

APTITUDE LEVEL AND ORIGINAL LEARNING

Television instruction was more effective for lower-aptitude groups

The Army Area I score is considered to be a good index of intelligence. That is, it measures many of the factors contained in intelligence tests. The design of the present study called for assignment of men to various platoons on the basis of their Army Area I scores so that the average score and distribution of scores would be highly similar for the half-companies receiving either television or regular instruction. This matching procedure, in addition to controlling for the effects of intelligence differences, also permitted separate statistical analysis of the performance of higher- and lower-intelligence groups under the two methods of training employed in this study.

Using the median of the Area I scores, trainees were divided into low- and high-aptitude groups. The cutoff score designating low Area I trainees was approximately 92. The average test performance of trainees in the lower group was computed for each of the subject matters taught by television or regular instruction. Statistical tests were then applied to determine whether the mean test-score differences obtained were significant. Table 4 summarizes the results.

Inspection of Table 4 indicates that in 10 out of 17 comparisons, the test performance of the lower Area I trainees who received television instruction was significantly better than similar low Area I trainees receiving regular instruction. In the remaining comparisons, there were no significant differences between the two methods of instruction for these low Area I groups.

When these results are compared with the over-all test performances listed in Table 3, the superiority of television over regular instruction is greatly sharpened. Whereas the over-all comparisons reveal TV to

[1]The results suggest that television instruction may be more effective for particular kinds of subject matters. This general issue is discussed in Chapter 4.

Table 4

LEARNING OF LOWER-APTITUDE MEN AFTER ORIGINAL TELEVISION OR REGULAR INSTRUCTION

(Two Primary Companies; 17 Tests for 14 Hours of Instruction)

Subject Matter	Mean Score For Groups		TV Compared to Regular Instruction
	TV	Regular	
M1 Functioning	7.825	7.264	Significant
Signal Communications			
Phonetic Alphabet	40.461	35.053	Significant
Military Time	5.540	4.264	Significant[a]
Military Justice	7.109	6.805	Not significant
Mines and Booby Traps	3.641	3.957	Not significant
Map Reading			
Hour 1	5.673	5.051	Significant[a]
Hour 2	5.222	4.160	Significant
Hour 3	4.551	3.672	Significant[a]
Hour 4	5.283	5.124	Not significant
Hour 6	6.497	6.699	Not significant
Hour 7			
Written test	3.642	3.900	Not significant
Performance test	2.485	2.224	Significant
Hour 8	3.483	3.371	Not significant
Squad Tactics	10.620	9.511	Significant[a]
Defense Against Air and Armor	9.077	7.662	Significant[a]
Light Machine Gun			
Written test	12.082	11.835	Not significant
Performance test	171.142[b]	191.046[b]	Significant

[a]In these comparisons, the superiority of television instruction was not found when over-all means (combined high and low Area I trainees) were compared. (See Table 3.)

[b]This is a time score in seconds. The lower the score the better the performance in disassembling the LMG.

be significantly superior in 5 out of 17 comparisons, isolating and comparing the test performances of the low Area I groups raises TV superiority to 10 out of 17 comparisons. The five instances in which television was superior to regular instruction in the over-all comparisons are not reversed when the low Area I groups are compared. What has happened is that when the low Area I test scores are compared television instruction proved to be significantly superior to regular instruction for five additional subject matters.

Such detailed analysis is not presented for the higher-aptitude trainees. Examination of their test scores indicates that the higher-aptitude groups generally learned well under either instructional method. In many instances they approached the ceiling of the test so that there was little room for any detection of differences among higher-aptitude groups. This condition did not prevail for the lower-aptitude groups.

Examination of the television instruction for the 14 hours of basic training suggests that in the instances where television was significantly superior to regular instruction for low Area I groups, greater use had been made of close-ups, superimposures, and similar techniques. These factors, however, are only suggestive since they were not varied systematically to determine their specific effects upon learning.[1]

RETENTION OF ORIGINAL LEARNING

Television instruction was at least as well remembered as regular instruction

The results described in the preceding sections of this chapter were based on tests administered to trainees immediately after they had received television or regular instruction. Although it is important to determine how much trainees know just after instruction, in most instances information imparted by Army instruction is not employed at once but usually finds some application weeks or months later. In view of this generally delayed application of Army basic training information, it becomes important to measure how much trainees remember, after an interval of time has passed, from their initial television or regular instruction. Such measures were used to further evaluate the relative effectiveness of the two instructional methods.

In the retention-testing procedure employed, the trainees in the two primary companies were recalled for testing approximately one month after their initial television or regular instruction.[2] During this time interval these trainees had received no additional formal training for the particular hours utilized in this study. However, for two of the subject matters, M1 Functioning and Military Time, the trainees received additional information in the course of their routine training. Since the trainees continued to use the M1 rifle throughout basic training, it was apparent that they had ample opportunity to gain additional informal training and information on the mechanics of the rifle. Likewise, the everyday use of military time in Army basic training probably served as an additional source of information for the trainees on this subject. An increase over original learning was recorded for both of these subject matters when retention tests were administered.

Lack of testing facilities prevented the administration of retention tests for the Light Machine Gun and the performance section of Map Reading, Hour 7. Table 5 indicates the average retention-test performances for the remaining 14 tests.

[1]Chapter 4 discusses suggested factors related to television instructional effectiveness.

[2]There were some losses in the number of trainees available for retention testing due to such factors as illness and special details. This loss was not large enough to be serious except in the case of the Signal Communications subject matter.

Table 5

RETENTION OF LEARNING AFTER TELEVISION OR REGULAR INSTRUCTION
(Primary Companies)

Subject Matter	Average Retention Score[a]		TV Compared to Regular Instruction
	TV Instruction	Regular Instruction	
M1 Functioning	10.183	9.399	Significant[b]
Signal Communications			
Phonetic Alphabet	34.050	31.062	Significant[b]
Military Time	8.325	7.038	Significant[c]
Military Justice	8.176	8.229	Not significant
Mines and Booby Traps	4.924	4.665	Not significant
Map Reading			
Hour 1	4.199	4.286	Not significant
Hour 2	6.834	6.136	Significant[b]
Hour 3	5.367	5.207	Not significant
Hour 4	6.512	6.558	Not significant
Hour 6	6.939	6.883	Not significant
Hour 7			
Written test	5.232	4.994	Not significant
Hour 8	4.981	4.969	Not significant
Squad Tactics	10.024	9.642	Not significant
Defense Against Air and Armor	8.688	9.212	Not significant

[a]Tested approximately one month after original instruction.
[b]The immediate test results also indicate the significant superiority of television instruction (see Table 3).
[c]No significant difference between television and regular instruction was found in immediate test results, but the difference approached significance.

As shown in Table 5, in four out of 14 comparisons the retention of television instruction is significantly better than that of regular instruction.[1] In the remaining comparisons, no significant differences in retention between the two methods were obtained. In general the retention results support the findings based on immediate-test performance; that is, in no instance is there a reversal where the immediate-test results indicate the superiority of television instruction. In one instance, Military Time, the retention results indicate the superiority of television instruction where the immediate-test results indicate no significant difference. In two comparisons where television instruction was significantly superior in immediate-test results (the performance test of Map Reading, Hour 7, and Light Machine Gun), it should be pointed out again that there was no opportunity to give retention tests.

[1]A significantly greater amount of original learning was retained by trainees who received television instruction.

The retention-test results should be interpreted against a background in which the average immediate-test score differences were fairly small. Despite the general drop in performance on the retention tests, television instruction maintained a significant superiority in both the immediate and retention-test situations for three comparisons. With one exception, Military Time, there was no significant reversal in the retention scores when compared with immediate-test scores (see Table 3). These results point to the conclusion that television instruction is remembered at least as well as regular instruction.

APTITUDE LEVEL AND RETENTION

As in the case of the immediate-test scores, a separate analysis was made of the performance of the low Area I trainees on the retention-test scores. The results are summarized in Table 6. Examination of this table indicates no important differences from the over-all comparisons presented in Table 5. In contrast to the results of immediate-test

Table 6

RETENTION OF LEARNING BY LOWER-APTITUDE MEN
AFTER TELEVISION OR REGULAR INSTRUCTION
(Primary Companies)

Subject Matter	Average Retention Score[a]		TV Compared to Regular Instruction
	TV Instruction	Regular Instruction	
M1 Functioning	8.171	7.224	Significant[b]
Signal Communications			
Phonetic Alphabet	27.475	23.950	Not significant[c]
Military Time	7.000	4.925	Significant[b]
Military Justice	6.763	6.566	Not significant
Mines and Booby Traps	3.024	3.071	Not significant
Map Reading			
Hour 1	3.100	3.338	Not significant
Hour 2	5.059	4.071	Significant[b]
Hour 3	3.655	3.560	Not significant
Hour 4	4.674	4.767	Not significant
Hour 6	5.247	5.173	Not significant
Hour 7			
Written test	3.390	2.915	Not significant
Hour 8	3.580	3.123	Not significant
Squad Tactics	8.518	7.145	Significant[d]
Defense Against Air and Armor	7.231	6.949	Not significant

[a]Tested approximately one month after initial instruction.
[b]Also significant in over-all comparison listed in Table 5.
[c]Significant in over-all comparison.
[d]Not significant in over-all comparison.

performance, which showed that low Area I trainees tended to do better with television instruction than with regular instruction, there appears to be no evidence that low Area I television trainees remember information better than low Area I men who had received regular instruction.

In two respects the results for low Area I trainees differ from the over-all retention results. Where the over-all results indicate the superiority of television for Phonetic Alphabet subject matter, no significant differences were found among the low Area I trainees despite the sizable absolute differences. This is attributed to the particularly low number of trainees available for this retention test, coupled with the greater variability of the tests for this subject matter. In the other change, for the Squad Tactics subject matter, no significant differences were found in the over-all retention effects whereas analysis of low Area I trainee test performance indicates the significant superiority of television instruction. The difference between the two methods of instruction for the remaining comparisons was not significant. These results indicate that low Area I trainees remember television instruction at least as well as regular instruction.

Chapter 4

RELATION OF TELEVISION INSTRUCTIONAL EFFECTIVENESS TO SUBJECT-MATTER CONTENT

TELEVISION EFFECTIVENESS FOR SPECIFIC SUBJECT MATTERS

Some of the anticipated by-products of the present study were leads or hypotheses concerning the most effective use of television as a teaching medium. The basic comparison between television and regular instruction provided many hints in this direction, although the study was not designed to systematically investigate them. In the over-all comparison (Table 3), television instruction is significantly superior to regular instruction for five subject matters. Since controls had been kept on such factors as aptitude, subject-matter content, and instructors, these subject matters were examined in an attempt to isolate those factors which appear to be related to the superiority of television instruction. On the basis of this examination, four hypotheses suggested themselves.

(1) Television instruction is particularly adaptable to training situations which require manipulation of small equipment pieces by the trainees.

Three of the subject matters which indicated a significant superiority for television instruction were Hour 7 (Performance Task) and Hour 2 of Map Reading and Light Machine Gun. All these subject matters required the trainee to manipulate small parts. One of the major differences between the two methods of instruction was that the television presentation permitted the extensive use of extreme close-ups of various parts and materials which had to be manipulated or used in some manner by the trainee. In regular instruction groups under normal training conditions, these close-up advantages could not be duplicated. The advantage of the television close-up appears to be correlated with the particular adaptability of television for teaching manipulation of small parts.

(2) Television instruction is particularly adaptable to training situations which require simple rote learning.

In two subject matters the trainees had to learn to connect a letter and a word and a picture. In the Phonetic Alphabet the trainee learned phonetic equivalents (i.e., A-Able, B-Baker), while in Squad Tactics he

had to learn arm and hand signals corresponding to various commands. In both of these subject matters television instruction was superior for low Area I trainees and in the Phonetic Alphabet it was better for high Area I trainees as well. The high Area I trainees learned the Squad Tactics material so well in each of the instructional situations that no differences could be detected in their test scores.

Examination of the television presentation for the subject matters showed that superimposures were used frequently. This technique makes it possible to present—simultaneously or at various times—two or more things which have to be learned. For the Phonetic Alphabet subject matter, a letter of the alphabet was shown first, and then its phonetic equivalent appeared alongside. After the letters of the alphabet had been displayed in this manner the procedure was repeated. In the repetition the letter of the alphabet appeared first on the screen and the students were asked to anticipate what the phonetic equivalent of this letter would be. A time allowance was made for the students to supply the equivalent and then the correct phonetic word was superimposed next to the alphabet letter on the screen. A similar procedure was attempted in the regular instruction session, using a blackboard, but it was not as easy to do and did not appear as effective as the television presentation. As the materials to be superimposed become more complex it would become increasingly difficult to use this procedure in regular instruction.

(3) Television instruction is particularly adaptable to training situations which require understanding of the relationships among small moving parts.

The M1 Functioning subject matter was concerned with the movement of small parts during the firing cycle of the M1 rifle. This task is complicated by the fact that the firing cycle begins and terminates within a fraction of a second. This factor, in combination with the small parts involved, presents a difficult teaching problem. In regular instruction an eight-foot mockup of the M1 rifle is used. However, the nearest trainee is about 20 feet away and the farthest trainee about 80 feet away from the mockup. These distances considerably reduce the possibility of the trainees seeing the small parts in movement. By use of television close-ups, the trainees could effectively see these various small parts moving in relation to each other during each phase of the firing cycle. The regular instruction trainees had to rely mainly on the instructor's verbal discussion of what was occurring during the cycle while the television trainees had the additional advantage of close-up visual information. Again the advantage of the television camera close-up—in this instance permitting presentation of small parts in movement—appears to be the important factor in the television superiority for this subject matter. Since the Army uses complex equipment with parts generally inaccessible for inspection by more than one or two trainees, the television camera would be particularly adaptable for teaching large groups of trainees how such equipment functions.

(4) Television instruction is as effective as regular instruction in conveying straightforward items of information.

In some subject matters, such as Military Justice, little use was made of the close-up or other advantages of the television camera. These were lecture-type subject matters in which the instructor spoke for the entire session, using a small number of charts, and there was little or no opportunity for employing television camera specialties. The test results indicated no significant differences between the two methods of instruction for these subject matters. In an emergency situation the Army might need to use television presentation on this minimal basis. The results of the present study would indicate that this could be done without fear of a significant loss in learning.

TELEVISION EFFECTIVENESS AND SPECIFIC CONTENT CATEGORIES

Another approach made to the problem of relating television effectiveness to instructional content was to classify all the items used in all the tests according to (1) the type of information being measured and/or (2) the presentation methods employed to impart this information. It was then possible to determine whether any of the resulting classes revealed consistent differences favoring either television or regular instruction.

A perusal of the types of items used in the study reveals that they can be placed into six different categories by classifying them simultaneously along the two dimensions specified in the preceding paragraph. These categories are as follows:

(1) Training aids may or may not be used in either television or regular instruction to impart simple items of information; e.g., "The color blue on a map stands for water." Training aids, when used, are essentially static in nature, that is, they merely repeat information given verbally.

(2) Training aids are used in both television and regular instruction to teach the nomenclature of pieces of equipment; e.g., "The object I am pointing to is called the barrel extension."

(3) Training aids are used in both television and regular instruction to indicate dynamic interrelationship among parts of the equipment while it is functioning; e.g., "The rifle is cocked as the bolt forces the hammer to the rear."

(4) Training aids are used as an adjunct to paired-associate learning, such as learning to connect a letter and a word or a word and a picture. An example of this type of presentation is the phonetic alphabet; in regular instruction A-Able, B-Baker, etc., are written on the blackboard while in television the same materials appeared on the television screen as superimposures.

(5) Training aids are used for recognition training; e.g., "The tank you see in the picture (or on the screen) is Russian."

(6) Training aids are used to teach manipulation of small pieces of equipment; e.g., "As you watch the demonstrator, follow him through all the steps involved in orienting a map by compass."

Table 7 indicates the number of items showing significant superiority for either regular or television instruction within each category. In four of the six categories there is a significant difference in the number of items, in favor of TV instruction. Moreover, there are no instances in which the number of items favoring regular instruction is statistically significant. Thus the results of this analysis give strong support to the hypothesis that the effectiveness of television as an instructional medium depends upon the particular type of instruction, presentational techniques, and other similar factors.

Table 7

COMPARATIVE EFFECTIVENESS OF TELEVISION AND REGULAR INSTRUCTION FOR SPECIFIC CONTENT CATEGORIES

(Based on 12 Tests[a])

Category	Number of Items in Category	Number of Items Significantly Superior	
		TV	Regular
(1) Simple information	80	3	3
(2) Nomenclature	12	2	2
(3) Interrelations among parts	8	3[b]	0
(4) Paired-associate learning	22	8[b]	0
(5) Recognition training	30	7[b]	3
(6) Manipulation of equipment	36	11[b]	0

[a]Includes items from all tests except Light Machine Gun, written and performance; Map Reading, performance; Phonetic Alphabet; and Military Time.

[b]Significantly greater than the number which would be significant by chance.

Chapter 5

KINESCOPES FOR INITIAL INSTRUCTION AND REFRESHER TRAINING

SUMMARY OF RESULTS

(1) In five comparisons between groups receiving kinescope or regular instruction, kinescope instruction was at least as effective as regular instruction.

(2) In using kinescopes as a review after initial instruction for five subject matters,

(a) Trainee test performance was significantly higher after a single kinescope review than after initial instruction, and

(b) Low-aptitude trainee test performance, after a single kinescope review, closely approached high-aptitude trainee test performance after initial instruction.

COMPARISON OF KINESCOPE AND REGULAR INSTRUCTION

The availability of kinescope equipment afforded an opportunity to compare kinescopes with regular instruction. These kinescopes were film duplicates of the live television instruction initially prepared for the basic comparison in this study. Limitations of time and some shortages in facilities precluded comparing kinescopes for all 14 hours of instruction. It was possible to utilize the kinescope records for only seven hours of instruction. The kinescopes were projected on the television receivers at the television reception building.

In this aspect of the study, a standby company was split into matched halves. One-half of the company received the kinescope instruction and the other half received regular instruction for a particular subject matter. The same instructor gave the regular instruction and was recorded on the kinescope. Seven different companies were used for the seven comparisons made. Under these matched conditions the results outlined in Table 8 were obtained.

Examination of the results reveals that in six of the seven comparisons no significant differences were found in the teaching effectiveness

Table 8

LEARNING AFTER KINESCOPE OR REGULAR INSTRUCTION

(Standby Companies[a])

Subject Matter	Test Mean Scores		Kinescope Compared to Regular Instruction
	Kinescope	Regular	
M1 Functioning	9.329	9.183	Not significant
Phonetic Alphabet	44.940	41.928	Significant
Military Time	6.361	6.976	Not significant
Map Reading, Hour 4	6.317	6.841	Not significant
Mines and Booby Traps	6.253	6.905	Not significant
Squad Tactics	11.694	12.338	Not significant
Defense Against Air and Armor	8.854	9.402	Not significant

[a]Seven different standby companies, one for each subject matter, are represented in the table.

of the two methods; in one comparison (Phonetic Alphabet), the kinescope was significantly better than regular instruction. These results suggest that kinescopes can be substituted for regular instruction in these subject matters without fear of any significant loss in teaching effectiveness.

Again, it must be emphasized that these comparisons between kinescope and regular instruction were carried out under matched conditions. Since the kinescopes were reproductions of the original live television presentations, they represented no attempt to produce the most effective kinescope teaching presentation. In addition, the best instructor in kinescope was compared with himself in regular instruction. If the kinescopes were compared with less effective regular instructors the superiority of kinescope instruction probably would be more evident.

While other studies have reported on kinescope and regular instruction, the comparisons in the present study were carried out for the following purposes:

(1) The matched conditions governing the comparisons were expected to provide a more sensitive measure of the two methods of instruction. Previous comparisons did not always control for such factors as instructors, subject matter content, or intelligence.

(2) Answers were sought to questions raised in the past as to what effect the generally "poor" quality of kinescopes has upon learning. Present production methods leave much to be desired in the quality of kinescopes as compared with regular films, and one often encounters the belief that these quality deficiencies would be accompanied by learning decrements.

The kinescopes used for comparisons in this study were produced under field conditions. From a technical standpoint, they were not satisfactory with respect to such factors as clarity, sound, and reproduction. Nevertheless, the comparisons with regular instruction provide

no evidence that such kinescope deficiencies produced significant decrements in test performance. If comparisons were made between live television and kinescope presentation, however, it is quite likely that the poor quality of the kinescope recordings would tend to produce some decrements in learning. Although no comparisons between kinescope and television presentation were made in the present study there is some indirect evidence that would support this hypothesis. Table 9 presents comparisons of the size of the differences between television and regular and between kinescope and regular mean scores. Examination of the difference columns in Table 9 indicates that all the original comparisons between television and regular were considerably more favorable toward television presentation than the corresponding comparisons between kinescope and regular presentation. In the original kinescope—regular comparisons, however, five of the seven mean differences favor regular. Moreover, in the remaining two hours, the differences favoring television over regular presentation are greater in magnitude than those favoring kinescope over regular presentation. It seems that although kinescope recordings were fairly comparable in teaching effectiveness to regular instruction, their quality may have tended to make them less effective than the television presentations from which the kinescopes were made.[1]

Table 9

DIFFERENCES IN MEAN SCORES
BETWEEN TELEVISION-REGULAR AND KINESCOPE-REGULAR COMPARISONS

Subject Matter	TV-Regular Comparison			Kinescope-Regular Comparison		
	Mean Scores		Difference Between TV and Regular	Mean Scores		Difference Between Kinescope and Regular
	TV	Regular		Kinescope	Regular	
M1 Functioning	9.940	9.148	+.792	9.329	9.183	+.146
Phonetic Alphabet	44.224	40.507	+3.717	44.940	41.928	+3.012
Military Time	6.901	6.342	+.559	6.361	6.976	−.615
Map Reading, Hour 4	7.122	6.811	+.311	6.317	6.841	−.524
Mines and Booby Traps	6.087	6.136	−.049	6.253	6.905	−.652
Squad Tactics	12.538	11.897	+.641	11.694	12.338	−.644
Defense Against Air and Armor	11.063	10.131	+.932	8.854	9.402	−.548

KINESCOPE REFRESHER PROCEDURE AND RESULTS

In Army basic training, an impressive amount of information and skills must be imparted to trainees within a relatively limited period of eight weeks. Even when it might be desirable to give trainees reviews in certain subject matters, shortages of qualified instructors and

[1]In Appendix F the loss of effectiveness of kinescopes is discussed further.

scheduling difficulties add to the problem. Therefore, any technique which could overcome some or all of these administrative and personnel factors and provide trainees with additional review would be of great value.

It became apparent that kinescopes might be useful for this purpose. Since the best instructor could be employed in kinescopes, the demands on regular instructors would be minimal. Technically, showing of a kinescope requires only a movie projector, a screen, and an auditorium—all normally found in good supply at most Army installations. There remained, therefore, the task of demonstrating how kinescopes can best be used with respect to their effect upon trainee learning.

The procedure selected for this purpose utilized five companies from among the standby companies which had received their initial training by kinescopes, television, or regular instruction. About a month after receiving instruction by one of these three methods, the companies were retested in the following manner:

(1) Three of the companies had initially received either kinescope or regular instruction. In retesting them, one-half of the trainees who had received kinescope and one-half of the trainees who had received regular instruction were grouped together and merely given a written test; this was done to measure the amount of forgetting which had occurred during the one-month interval. The remaining trainees in these three companies were shown a kinescope of the original instruction—the same kinescope used in initial training for the kinescope groups. Following this kinescope review, these trainees were given a written test.

(2) The other two companies had received their initial training either by television or regular instruction. One month later these companies were retested in the same manner as the first group. That is, one-half of the trainees who had received television and regular instruction were merely given a retest. The remaining half saw a kinescope review and then were retested.

Over-all Comparison of Original Learning, Retention, and Refresher Training

Five subject matters, and five different standby companies, were used for the comparison. Table 10 indicates the over-all mean scores obtained under the various original learning, refresher, and retention procedures.

In examining the results presented in Table 10 the following points may be noted:

(1) For each of the five subject matters, trainee test performance was higher after refresher training than it was after initial training. These differences in all five cases are statistically significant.

(2) With one exception, retention data reveal a decrement of varying magnitude about a month after original training. For all four subject matters, the decrement was statistically significant. The results for

Table 10

LEARNING MEASURED UNDER CONDITIONS
OF ORIGINAL TRAINING, REFRESHER TRAINING, AND RETENTION
(Standby Companies)

Subject Matter	Original Training[a] (Regular, TV, Kinescope)	Refresher Training	Retention
Phonetic Alphabet	43.434	47.647[b]	37.855[c]
Military Time	6.668	8.147[b]	7.162
Map Reading, Hour 4	6.579	7.333[b]	6.021[c]
Squad Tactics	12.110	14.560[b]	8.400[c]
Defense Against Air and Armor	9.030	11.026[b]	7.462[c]

[a]Mean scores for all trainees in the company without regard to kind of original training. Statistical analysis indicated that increase in test performance produced by the refresher technique was not significantly related to the type of original instruction.

[b]Mean score is significantly better than the test score either following original training or under retention testing conditions.

[c]Mean score is significantly lower than the original training score.

Military Time indicate gain during the straight retention testing as compared to original learning. This gain was previously encountered and attributed to the widespread use of military time in the military situation.

(3) In all five comparison tests, performance for refresher training is significantly greater than that for retention.

The over-all picture provided by an examination of the results contained in Table 10 is that of a general decline in test performance, with one exception, a month after initial training. However, when trainees were given a kinescope refresher film, their test performance in all cases was significantly higher than that achieved under any of the immediate training methods.

Effect Upon Test Performance of Refresher Training for Low Area I Trainees

An analysis similar to that described in the preceding section was also performed for low Area I trainees. Table 11 compares the test performance of low Area I groups under the conditions of original training, refresher training, and retention.

Examination of Table 11 reveals that in all cases, the effect of refresher training was to raise the low Area I trainees beyond their level of learning after original training. These differences between original and refresher scores are all statistically significant. With one exception (Map Reading, Hour 4), the kinescope refresher produced gains of such magnitude that the test scores of the lower Area I trainees, following this one review, compared favorably with the scores of the high Area I trainees following the original instruction (see Table 12).

Table 11

LEARNING OF LOWER-APTITUDE MEN UNDER CONDITIONS OF ORIGINAL TRAINING, REFRESHER TRAINING, AND RETENTION

(Standby Companies)

Subject Matter	Original Training Regular, TV, Kinescope	Refresher Training	Retention
Phonetic Alphabet	39.108	45.000[a]	33.294[b]
Military Time	4.607	7.265[a]	5.324
Map Reading, Hour 4	4.694	5.333[a]	4.375
Squad Tactics	10.180	12.840[a]	7.160[b]
Defense Against Air and Armor	7.400	9.325[a]	6.100[b]

[a]Mean score is significantly better than the test score either following original training or under retention testing conditions.

[b]Mean score is significantly lower than the original training score.

The failure of low Area I trainees to make more sizable gains on Map Reading, Hour 4, may be due to the fact that the material is complex, perhaps sufficiently so to be beyond the comprehension of most of the lower-intelligence trainees. Under these circumstances, little improvement is possible. On the other hand, the materials in the other four subject matters require little more than rote memorization. These results, then, are consonant with what might be expected—trainees of lower intelligence show greater improvement with repetition of simple material than of more complex material.

The general conclusion is that low Area I trainees benefited greatly from kinescope-refresher training. It should be cautioned that this finding does not imply any inherent advantages of the kinescope refresher over other refresher techniques—for example, merely repeating the original live instruction. The results do indicate that, if it is ever desirable to improve the learning of lower-aptitude trainees by repeating instruction, kinescope recordings provide an administratively feasible way of accomplishing this end.

Table 12

LEARNING OF LOWER-APTITUDE MEN AFTER REFRESHER TRAINING AND HIGHER-APTITUDE MEN AFTER ORIGINAL TRAINING

(Standby Companies)

Subject Matter	Original Training for High Area I Trainees	Refresher Training for Low Area I Trainees	Original Training for Low Area I Trainees
Phonetic Alphabet	47.865	45.000	39.108
Military Time	8.780	7.265	4.607
Map Reading, Hour 4	8.407	5.333	4.694
Squad Tactics	13.931	12.840	10.180
Defense Against Air and Armor	10.737	9.325	7.400

APPENDICES

Appendix A

"NOVELTY" OR MOTIVATION EFFECTS OF TELEVISION TRAINING

A persistent question encountered in the interpretation of the results in the present study involves the so-called "novelty effect." The relative newness of the television medium has led some to the strong belief that any superiority evidenced by television instruction might be attributed to the greater motivation of trainees receiving such instruction and not to any intrinsic superiority of television presentation itself. That is, it is said that the novelty of television instruction leads to increased attention or alertness by the students for what is being taught and were students to possess the same motivation for regular instruction there would be little or no difference between the two methods. This question of motivation, often referred to as the "novelty effect," has appeared in the past when films or radio have been used for instructional purposes, and it will probably crop up whenever a new medium is utilized for instructional purposes.

In this connection one might refer to the state of this question of motivation in relation to such older media as film and radio. The question of attributing increased motivation for the teaching effectiveness of films is rarely raised today. It is accepted that some films do not teach as well as, and some teach better than, regular instruction. Differences between the two modes of instruction are usually attributed to the training content of either the film or the regular instruction. For example, the inferior teaching effectiveness of film A might be attributable to a lack of a terminal summary or film B may teach better than regular instruction because of certain close-up advantages or because of some effective presentational sequence. The fact that the novelty effect of films is seldom referred to may be due to the long history and familiarity with film teaching. With the passage of time, the novelty question may suffer a similar fate where television is concerned.

An attempt was made in the present study to reduce this hypothesized additional motivation of the television trainees by making both television and regular instruction trainees aware that they were participating in a comparative study.[1] For this reason, distinctive insignia were issued to the men in each of the instructional groups. These attempts to reduce

[1]There is some evidence that participation in a study will raise the motivation of subjects. The phenomenon is sometimes referred to as the "Hawthorne" effect and is conceived of as being different from the "novelty" effect. Whether the differences are more than semantic or whether they have different measurable effects in a particular study is not known.

possible initial differences in motivation were guided by the more important objective of obtaining information on the relative teaching effectiveness of television training, unobscured by the problem of differences in motivation. Observation of the overt behavior of trainees receiving either regular or television instruction indicated no apparent difference between the groups. It must be admitted, however, that it is not possible to make an unqualified claim that both groups were equally motivated.

While the present study was not designed specifically to investigate this problem, there is indirect evidence bearing on it. It was assumed that if the motivational or novelty effect attributed to television existed, it would be highest in the initial hours of instruction and would tend to taper off as the trainees in the primary companies approached the 12th, 13th, or 14th hour of television instruction. This tapering off or decline in initial motivation should reflect in the test performance of the two primary-company trainees. The most salient evidence on this point is the fact that the differences found in this study appear to be related to the type of subject matter rather than to the chronological position in which the instruction came.[1] For example, three of the largest differences favoring television were found in Hour 2 and Hour 7b (performance) of Map Reading and Light Machine Gun Disassembly. These subject matters were given in the 4th, 5th, and 7th weeks of basic training after the trainees had had 5, 8, and 13 exposures, respectively, to television instruction (see Table 2).

In view of these findings, it appears reasonable to conclude that there is no evidence in this study of any special motivating effects in television presentations. This may be due to the fact that (1) there is no special motivating effect or (2) the experimenters succeeded in "equalizing" motivation so that this factor did not obscure the comparison of television and regular instruction. In either case, in view of the strong evidence that television effectiveness is related to subject-matter content, it does not seem probable that the results reported in this study are attributable to novelty effects.

[1]The relation of television effectiveness to particular types of subject matter is treated in Chapter 4.

Appendix B

TRAINEE PRETEST SCORES

In making the various comparisons in this study, average test scores achieved by trainees after instruction were used. These scores were used because the teaching effectiveness of regular instruction was accepted as the standard for evaluating television and kinescope instruction. If the study had been concerned with producing the most effective television instruction and with inducing the most learning possible for a given hour of instruction, differences between pre- and post-test scores would have been used.

Regular instruction pretest scores were obtained for one standby company. Although not directly relevant to the aims of the study, these data provide a picture of the amount of learning generally produced in current regular instruction for the 14 hours of basic training used. By comparing these pretest scores with regular instruction post-test scores, important implications can be drawn for military training.

The pretest scores were obtained by matching one basic training company for aptitude (Area I scores) with the two primary companies used for the basic comparison. This standby company took its basic training about the same time and in the same sequence as the primary companies. Prior to receiving regular instruction in any one of the 14 hours of training used in this study, the trainees in the standby company were given a test to measure how much they knew before receiving this instruction. Table B-1 summarizes these pretest scores for all subject matters except Light Machine Gun disassembly[1] for the company as a whole and for the upper- and lower-aptitude subgroups into which the company was divided. For comparative purposes the regular instruction achievement scores obtained by the lower-aptitude trainees in the primary companies used in this study are listed in the last column of the table.

Examination of Table B-1 reveals relatively high test scores in several subject matters for the brighter trainees prior to instruction.

[1]The performance requirements of the test for Light Machine Gun disassembly made it administratively unfeasible for pretest purposes.

In fact, by comparing the pre-instruction level of knowledge of the high Area I trainees with the post-instruction level of the low Area I trainees, it will be seen that in seven instances the pre-instruction level of the brighter trainees is higher than the post-instruction level of the duller trainees. An examination of the pre- and post-test scores for the lower-aptitude groups alone shows that in all cases regular instruction does produce varying increases in test performance. These findings have certain general implications for training which might well be studied in the light of present training procedures.

Table B-1

PRETEST SCORES FOR HIGHER- AND LOWER-APTITUDE TRAINEES AND POST-TEST SCORES FOR LOWER-APTITUDE TRAINEES[a]

Subject Matter[b]	Pretest			Post-Test (Regular Instruction)
	All Trainees	Upper 50%	Lower 50%	Lower 50%
*M1 Functioning	8.030	9.439	6.622	7.264
Phonetic Alphabet	4.175	6.438	1.913	35.053
*Military Time	4.044	5.638	2.450	4.264
Military Justice	6.358	7.307	5.409	6.805
Mines and Booby Traps	2.081	2.772	1.386	3.957
Map Reading				
Hour 1	2.697	3.218	2.141	5.051
Hour 2	2.665	3.487	1.808	4.160
*Hour 3	3.368	4.269	2.423	3.672
*Hour 4	4.323	5.564	3.026	5.124
Hour 6	4.637	5.260	4.010	6.699
Hour 7				
Written test	2.881	3.296	2.463	3.900
Performance test	.536	.666	.405	2.224
*Hour 8	3.845	4.831	2.856	3.371
Squad Tactics	2.831	3.877	1.785	9.511
*Defense Against Air and Armor	6.909	8.012	5.805	7.662

[a]Tests covering 13 hours of regular instruction.

[b]*indicates that pre-instruction performance of higher-aptitude trainees is higher than post-instruction performance of lower-aptitude trainees.

Appendix C

TRAINEE-REACTION QUESTIONNAIRE

In preparing the television and regular instruction hours for use in the present study, the educational objectives listed in the lesson plans were used as a guide. However, adherence to these lesson plans did not always guarantee that the instructor would adequately cover the lesson plan materials. While an analysis of test results often revealed teaching inadequacies and the attempts made to correct them, it was thought that information on certain non-quantitative aspects of teaching would also be helpful in preparing the television and regular instruction hours. A trainee-reaction questionnaire was devised for this purpose and a copy is reproduced in this Appendix.

The questionnaire was administered to all trainees after the achievement test. The results were immediately tabulated and used to improve both regular and television instruction. The information obtained from many thousands of these questionnaires proved invaluable in planning instructional hours. In general, the questionnaire responses agreed with and supplemented the test results. For example, when a particular item on a test was missed by a majority of trainees, then, item 5 or 7 on the questionnaire would often list an instruction deficiency noticed by the trainees. These deficiencies generally were related to failure on the test item. In this way, the questionnaire was often able to pinpoint a particular omission or error in instruction which was reflected in the test results. Other questionnaire items provided valuable information on instructor qualifications as well as on trainee attitudes toward instruction. A revised version of this questionnaire is being used in a current study. This type of questionnaire is highly recommended for use in preparing television instructional hours.

QUESTIONNAIRE

Date_____

Name_____

Serial Number_____

You have just finished receiving instruction. Now we would like your help in planning and improving this instruction. Your answers to these brief questions will help us in this job.

1. In the test you just took, was there any part you couldn't answer because it wasn't covered well in the instruction?
   _____(Yes or No)

2. If your answer to Question 1 is "Yes," what part of the lesson did you miss and could not answer on the test?

   _____

   _____

3. Were you able to see the instructor without interference at all times (someone's head blocking your view, etc.)?
   _____(Yes or No)

4. When the instructor used charts or diagrams or pointed to various things, were you able to see them clearly?
   _____(Yes or No)

5. Did you feel that you needed more time to look at anything the instructor pointed to?_____(Yes or No)

   If your answer is "Yes," what part did not appear long enough?

   _____

   _____

6. In general did you think the instructor:

   a. spoke too fast for you to follow_____(Yes or No)_____

   b. spoke too slowly so that you became bored_____(Yes or No)

   c. spoke so that you could understand what was going on
      _____(Yes or No)

7. Was there any part of instruction which you couldn't understand?
_____(Yes or No)

If your answer is "Yes," write in which section you missed:

1. When he was talking about or showing_____

_____

_____

8. Check any of the following statements if it applies to your opinion of the television instruction you just received:

I thought the instruction was too long _____(Yes or No)

I began getting tired or bored near the end of the instruction
_____(Yes or No)

I thought the instruction was interesting_____(Yes or No)

I think I learned a great deal from the instruction
_____(Yes or No)

Although I liked the instruction, I would cut it by_____minutes

I think color would have helped me learn better if used in_____

_____

_____

(Write in any part of the teaching where you think color would have helped you learn better. If you don't think color would have helped, write in "None" in the blank space).

I would have liked to see more close-ups of_____

_____

Appendix D

THE PRODUCTION OF EDUCATIONAL TELEVISION INSTRUCTION

Instructor Training Requirements for Television Teaching

In the course of preparing 84 hours of television instruction, 21 instructors were trained. The fund of experience obtained in these activities should provide information of value to those who might be confronted with a similar training problem. The television producer-director, a military person, was asked to keep detailed notes on his production and instructor training activities. These notes, together with observations by HumRRO personnel, are the main source for the information contained in this section.

Recommendations from previous television reports, as well as the limitations in time available for the study, led to the procedure of using instructors experienced in teaching the hours of instruction selected. Two instructors, judged by the Camp Gordon school committee to be the best ones available, were selected for each hour of instruction. An exception was made in Map Reading, Hours 1 to 4, where one instructor taught two hours of map reading because shortages precluded obtaining additional instructors.

One of the first steps in preparing the instructor for television teaching was to have him go through his instructional material. No cameras were present and the audience consisted of the producer-director and a researcher. The producer-director was primarily interested in assessing the instructor's stage presence and in determining what training materials and camera movements were needed or suggested by the presentation. The research man checked the presentation against the material contained in the lesson plan and made notes and suggestions as to any deviations from this plan. During these preliminary rehearsals or "dry runs," suggestions were made as to speech rate, elimination of dramatic or theatrical material or movements, or other pertinent factors.

In general, the instructors performed well during these initial trials. Although there were many corrections made, the phenomenon of "stage fright" or nervousness did not appear. The amount of time spent in this phase varied from four to eight hours. One subject matter, Military Justice, required eight hours of preliminary rehearsals. This was necessary

because the instructors had adopted the practice of not covering the lesson-plan material by direct lecture, but had depended upon student questioning to cover particular sections of the lesson plan. However, in the observation of actual instruction using this technique it soon became apparent that student questioning did not achieve this objective and that, in fact, parts of the lesson plan were not covered. The questioning procedure was dropped and the instructor covered the lesson material by direct lecture and demonstration.

Camera Rehearsal

In the second stage of instructor training, camera rehearsal, the instructor went through his teaching routine in front of the television camera. His actions and presentation were observed over a television receiver or "monitor." In this rehearsal phase the instructor's presentation was coordinated with available training aids in respect to such factors as movement and placement. Arm, hand, and other bodily movements were corrected; as, for example, when the instructor's hand or part of his body might go outside the camera's range.

For most of the instructors, rehearsal in front of the camera did not produce any evidence of emotionality or change in presence. Some instructors, however, did change radically when confronted by the camera. The excellent adjustment these men evidenced in their regular teaching and during initial rehearsals gave way to many of the responses associated with "stage fright." Tense posturing, stammering, frequent marked deviations from or omissions of lesson-plan material were some of the reactions noted. With continuous rehearsal, however, most of these nervous reactions tended to disappear or were sharply reduced.

Sufficient time was not available to pursue methods or techniques for preventing or reducing these nervous reactions, although a number of recommendations were made by members of the technical staff who had encountered such reactions in their commercial television experience. One suggestion was to introduce a small audience during rehearsal, on the theory that the instructor was accustomed to adjusting to a live audience during his teaching. Another was to isolate the instructor with the director, exhorting the instructor to forget about the camera and talk directly to the director. While success was claimed for these suggested techniques, they were not investigated.

During actual televising of a particular hour of instruction to the trainees the following incident sometimes occurred: Instructors who had gone through all rehearsals without mishap, and were considered ready for actual televising, became disorganized when on the air. Fortunately this type of behavior was first detected during a preliminary tryout of a televised program. It was decided that, when this happened, the best procedure would be for the instructor to be made aware that he was omitting material in the lecture plan or deviating from the sequence of the material. He was then to correct himself by going back and filling in the missing material or by reorganizing his lecture while on the air.

Table D-1

TIME SPENT ON REHEARSAL
FOR EACH OF THE SUBJECT MATTERS[a]

Subject Matter	Dry Runs (hours)	Camera Rehearsal		Telecasts (hours)
		Instructor	Time (hours)	
Map Reading (Hours 1-4) (all instructors)	4	A	5	16
		B	7	
		C	7	
		D	7	
Squad Tactics	4	A	4	3
		B	4	
Light Machine Gun	4	A	5	3
		B	5	
M1 Functioning	8	A	6	3
		B	6	
Signal Communications	5	A	10	6
		B	10	
Mines and Booby Traps	6	A	8	4
		B	8	
Military Justice	8	A	12	3
		B	12	
Map Reading (Hours 6-8) (all instructors)	4	A	10	6
		B	7	
		C	7	
Defense Against Air and Armor	3	A	8	3
		B	8	
		(Separate record-1 Hr.)		

[a]The rehearsal time for TV instruction actually utilized and reported for comparisons made in this study is listed here. The various "pilot" or preliminary TV sessions used to try out new techniques and procedures and to train technical personnel are not included.

During the course of the study, several instructors "blew up" while on the air and corrected themselves in this fashion. Trainees, when questioned later, indicated that one of the things they liked about the televised instruction was the fact that the instructor did make mistakes and had corrected himself.[1]

Table D-1 indicates the amount of rehearsal and training time expended for each instructor for the hours of training utilized in the present study.

[1]Preliminary results on the use of Tele-Q prompting equipment in an ongoing study indicate no instance of an instructor "blowing up" or becoming disorganized during television instruction.

Use of Experienced Instructors

Experience in training nervous instructors—and even those who responded well—led to the belief that the almost universal recommendation that experienced instructors be used for television teaching needed investigation. Some of the findings supporting such an inquiry are:

(1) For some subject matters, the instructors were required to make certain changes in their lecture material in order to conform more closely to the requirements of the lesson plans as well as for other reasons. Several instructors found these changes difficult to make. They had had so much experience in delivering their lecture in a particular fashion that a conflict arose when they tried to change or add to this material. Researchers have often encountered this phenomenon of the resistance of strong habits to newer learning. When an instructor did master new materials during rehearsal, he would often revert to his older teaching habits under the stress of teaching a televised program. Such a reversion often accounted for the disorganized behavior reported previously.

(2) The instructors selected were experienced in teaching regular classes usually from a platform or stage. They had acquired certain gestures, wide movements on the stage, and other mannerisms which were not suitable for the requirements of the television camera. A great deal of time was spent in modifying or trying to eliminate these movements.

These instructor training difficulties led to the belief that using an instructor who had never taught a particular subject matter might be a better procedure for television teaching. The usual rationale for employing an experienced instructor is that he is thoroughly familiar with the material and has an accompanying facility in teaching, rapport with students, etc. In addition, there is the saving in time because the material has been mastered. This rationale was not entirely supported by the experience in the present study. It is true that limitations of time would have precluded retraining new instructors. But as has been indicated, experience in teaching was not always accompanied by the anticipated facility in instruction. In several instances, in fact, experience was accompanied by inability to adapt to modifications in teaching techniques. This latter weakness was considered the strongest argument for an investigation of the use of "naive" instructors for television presentation.[1]

The Role of the Television Director-Producer

Previous television studies have emphasized the necessity of close liaison between the research or educational specialist and the television

[1]In this connection, "prompting" equipments (available for the present study) should meet the objection as to the amount of time needed to retrain new TV instructors. This equipment, mounted under a television camera, permits the instructor to read his material, and he, in turn, is paced and guided by the equipment.

director or producer. The experiences encountered in the present study lend strong endorsement to this recommendation. Future application of television for instructional purposes will necessitate relationships between the educational personnel and the technical television personnel. The purpose of this section is to provide information bearing upon the problems encountered in this study in making this liaison.

Utilization of television for instructional purposes requires the services of a producer or director because of the technical problems involved in manipulating television equipment effectively. One of the major problems facing research personnel is that of communicating to this technical person the teaching or educational requirements for a particular hour of instruction. This task is complicated by the fact that most experienced television director-producers have acquired a fund of empirical devices and "rule of thumb" procedures for presenting materials in commercial settings. This previous experience frequently conflicts with the aims of the psychologists. For example, there is a strong desire by television producers to insert music, humor, and similar commercial presentation formats. These features are not ordinarily found in Army instruction. Nor is there any experimental evidence in relation to learning to support their use. Since the study design called for keeping current Army instruction unchanged, it was indicated that such devices should not be used in the television presentations. As the work progressed, mutual understanding of the relationship between technical considerations and the research objective of the study developed. A large number of techniques utilized in commercial television should be investigated.

Producer-Director Comments

The viewpoint of the television director-producer[1] who cooperated in the present study was obtained and may be of interest. He joined the study with a background in commercial television techniques, but with little experience in utilizing television for instructional purposes. He was asked to prepare a paper describing his experiences in adapting to the needs of a study experimentally evaluating television for instructional purposes. At the conclusion of the study, he wrote the following:

"In training via television, there is no longer one man instructing a class, rather, there are two; one before the camera, the instructor, and one behind the camera, the director. This director in television training must coordinate the teaching ability of the instructor with his own knowledge of visual presentation. In this manner, a two-way control is held over the telecast resulting in a smoother, compact, better teaching vehicle of presentation.

"The director must learn the subject matter as well as, or better than, the actual instructor. He must concern himself with detailed instructor training. He must place himself in the student's position and visualize

[1]Lt. Donald A. Tuckwood, Signal Corps Pictorial Center.

the student's reaction to specific repetition and explanation. He must integrate as many learning methods as possible into the instruction and eliminate instructor imperfections such as slurring and lack of stress upon vital points. He must make appropriate use of the teaching advantages that TV offers, such as closeups, to follow the exact sequence of events established during rehearsal. Tight closeups must be planned beforehand, and the instructor must be taught to refer to the studio monitor constantly. The instructor's hand and pointer movements must be designed to relate the small with the whole; for instance, in the functioning of the M-1 Rifle the trigger hammer hooks do not mean much when shown on a tight closeup by themselves; however, when related to the entire trigger housing group vocally and with hand movements—visually—from a medium closeup to a tight closeup, their relationship is definitely established.

"The lecture type of presentation was the most difficult to produce via TV, for the material itself is often difficult to convey and the personality and teaching ability of the instructor are the only basic factors available for transmitting knowledge. This type of presentation can be concentrated in picture form upon the instructor. The director should eliminate as much movement as possible since with each move the instructor tends to deviate from the subject. Charts, blackboard, slides, and superimpositions can be used to hold together the main points of discussion.

"Visual and vocal coverage of conventional learning methods all tend to add learning value. The hour on Signal Communications, teaching the phonetic alphabet, is a good example of this type of telecast. A magic board was utilized to amplify upon the instruction. As each phonetic word was discussed it appeared on the board and then could be wiped away as if by magic. That element of mystery served as an additional learning feature in this lecture-type demonstration.

"A large instructor training program, with all the instructors attending was conducted to give the men an idea as to how to perform before the television cameras. The Army training program lesson plans were broken down to a sequence of possible camera angles and presentation points. Cards were introduced to amplify, wherever possible, the main points of instruction. Each was designed to cover points a number of times and thus create an association of ideas, so that what was vocally expressed could also be visualized. At all times, the ATP lesson plan was followed, so that any difference between what was covered in the live presentation and the televised class would be avoided.

"A rough script was compiled from this lesson plan conference. Rehearsal times were set up; first dry runs, then camera rehearsals, final dress rehearsal before each presentation, and finally—the telecast.

"Each hour of training varied in presentation, but they can be generally broken down into two categories: Demonstration Type and Lecture Type.

"By far, the simplest to produce was the demonstration type, for here is specific action coupled with explanation. There is less work with instructor training, for the instructor is no longer the main point within

the picture. The demonstration and the action that goes with it is of most importance. The main difficulty in this type of presentation is in training the focus of attention, eye contact, optical effects, etc. The director must make use of existing facilities wherever possible. Just as he would create a mood for a dramatic program, he must create a receptive feeling toward learning.

"Simplicity, prior planning, and ingenuity were the three key points for every presentation. Though certain video effects or 'gimmicks' would have an entertaining effect and hold the attention of low aptitude students, any attempt at such effects had to be controlled lest they would interfere with the over-all production and occupy too much time. Where, for instance, a series of cards would make for better video presentation, one card would often have more teaching effect—simplicity again. Prior planning meant instruction training, crew coordination, scripts, props, scheduling the thousand and one details of television production. Ingenuity meant everything! Without it, there could have been no telecasts.

"Literal factual pictures conveyed the knowledge, all pertinent action had to be seen clearly, and the important points stressed vocally as well as visually. The screen concentrated attention, the planning eliminated extraneous material, and, despite unpolished performances due to the lack of professional instructors and the ultimate in facilities, the presentations were immediate enough to lend an air of informality and closeness to the audience."

Appendix E

THE USE OF PARTICIPATION PROCEDURES IN TELEVISION INSTRUCTION

Television Instruction Can Effectively Utilize Student Participation

A frequent question raised in connection with television teaching is: "What is the effect upon students and instructors of not being able to raise and answer questions?" This problem is touched upon by other questions such as "Since the instructor has no contact with the students, how does he know whether his material is getting across or if the students are learning?" Or, "Since the students sit in front of a screen, don't they assume a passive role, which we know is not conducive to learning?"

These questions and the problems they raise have been encountered in previous research on television instruction. In one of these studies, an attempt was made to set up a two-way communication system between the instructor at the television studio and the students located at another site.[1] Another technique described was that of incorporating a "panel" of four or five students in the studio with the instructor. The function of this panel was to raise questions and receive answers from the instructor. Reports on these techniques were discouraging. In carrying out the present study, it was thought that some attempt should be made to evaluate other methods bearing upon this problem.

The problem was approached with the viewpoint that all these questions could be rephrased in these terms: "What are the effects of isolating the instructor from students, preventing students from asking questions, etc., upon trainee learning?"

Several approaches were made in evaluating this problem. One of the first was to examine the types of questions raised by students during regular instruction at Camp Gordon. Many classes were observed and notes made on these questions. In the majority of instances, it was found that many of the questions were irrelevant to the objectives of the lesson

[1]Robert T. Rock, Jr., James S. Duva, John E. Murray, *Training by Television: The Comparative Effectiveness of Instruction by Television, Television Recordings, and Conventional Classroom Procedures* (SDC Report 476-02-2). Prepared for Special Devices Center, Port Washington, Long Island, N.Y., by Fordham University (Subcontractor), May 1951.

plan or reflected omission by the instructor of information suggested by the lesson plan. Some questions persisted from class to class, and upon examination were found to indicate a teaching or presentation deficiency of the subject matter. With this information as a guide, the following steps were taken:

(1) The instructor was trained to cover the lesson-plan objectives more completely.
(2) Where necessary, attempts were made to enhance the teaching effectiveness for particular lesson-plan sections by using charts and similar devices.
(3) A technique was used in which important questions were incorporated in the teaching. That is, the instructor raised the question, asked the student for an answer, and then gave the correct answer.

These procedures were, of course, employed in both the television and regular instruction sessions used in the present study. When these procedures were used, no indication was found in the trainee-reaction questionnaire of any dissatisfaction because of lack of contact between instructor and trainees. Camp Gordon school authorities and instructors were of the opinion that these procedures greatly enhanced trainee interest and response to instruction.

Student participation is another aspect of the problem. Television instruction generally induces a mental picture of a number of students passively seated before a television receiver. There is enough evidence to suggest that such a situation is not the most conducive for effective teaching and learning. Experimental studies in other areas have indicated that learning is more effective where the student is asked to participate in some active manner. At the time of this study, no research had been done on applying participation procedures in television instruction. It was decided, therefore, to use this study as a vehicle for applying and evaluating such procedures in television teaching.

For various subject matters, students were asked to call out correct answers or to write down materials suggested by the instructor. In one subject matter, the Light Machine Gun, the trainees were instructed to disassemble a light machine gun. In this procedure, the television instructor first asked the trainees to watch him while he was disassembling the weapon. Then each trainee was provided with a machine gun and a disassembling tool. The instructor "paced" the trainees in disassembling the weapon by first asking them to watch him remove a particular piece and then telling them to do the same thing. In practice this type of participation appeared to be most impressive. Because of the close-up views of the television camera, one instructor was able to provide "personal instruction" to a group of men. In ordinary instruction, such a group would require one instructor plus four assistants and several large, expensive mockups.

The other participation techniques also appeared effective. The exhortations by the instructor for the students to call out or name various parts were greeted with loud and enthusiastic responses from

the students. The fact that the television instructor was not in the classroom and did not have "contact" with them as ordinarily defined, seemed not to be noticed by the students when they were asked to do various things by the instructor. These participation techniques were, of course, employed in the regular instruction with equal success. What is of importance is that evidence was obtained for the first time that students can effectively participate under conditions of television instruction.

Appendix F

EFFECTIVENESS OF KINESCOPES RELATED TO PRESENTATIONAL VARIABLES

During the course of the study at Camp Gordon, a number of questions were raised concerning what effect the quality of the visual image has upon the teaching effectiveness of television instruction. These questions were particularly pointed toward determining whether kinescopic recordings might be substituted for either television or regular instruction. These questions were particularly relevant because of the rather poor quality of the image in present kinescopic recordings.

Two of the hypotheses that could be advanced concerning putative effects of poorer image quality are as follows:

(1) Instruction containing materials which require a good visual appreciation of the content to be learned could be expected to be seriously affected by the poorer quality of kinescopic recordings.

(2) Materials which are mainly informative in character and do not require visual appreciation of the content would not be expected to show any appreciable loss from poor-quality images.

Since all of the television hours at Camp Gordon were recorded kinescopically, there was a good opportunity to compare the teaching effectiveness of kinescopes with live television presentation. However, most of the kinescopes were not ready for use until late in the study, so it was not possible to compare their effectiveness with previous television presentations because of large differences in such factors as trainee composition or weather conditions.

It became apparent that the same methods might be used to determine the effects of quality of image as were used to partial out those presentational variables which are related to effective television presentation; that is, an item analysis could be performed to determine whether the categories mentioned in Chapter 4 now distinguish between kinescope and regular instruction.

Altogether, seven kinescopes were compared to regular instruction. When the items appearing in five tests for these hours were placed in the six presentational categories (Table F-1), it was found that none of the categories provided evidence of statistical superiority of kinescope to regular instruction. This finding contrasts with the results in the comparison of TV with regular instruction, using these identical test

items, as television was significantly superior in four categories. Not only did kinescopes fail to show superiority in any of these categories, but there was actually a reversal in one of the categories—the one dealing with recognition training. The number of items significantly favoring regular in this category was significantly greater than chance. It therefore seems reasonable to conclude that the quality of kinescopes as presently made under field conditions does have a detrimental effect upon learning. What is more, it appears that this detrimental effect is more pronounced with subject matters where visual content is important.

Table F-1

EFFECTIVENESS OF TELEVISION, REGULAR, AND KINESCOPE INSTRUCTION FOR SPECIFIC CONTENT CATEGORIES

(Based on Five Tests[a])

Category	Number of Items in Category	Number of Items Significantly Superior in TV-Regular Comparisons		Number of Items Significantly Superior in Kinescope-Regular Comparisons	
		TV	Regular	Kinescope	Regular
Simple information	21	2	1	1	3
Nomenclature	6	0	1	0	1
Interrelations among parts	5	2[b]	0	0	0
Paired-associate learning	18	7[c]	0	2	1
Recognition training	15	4[c]	2	2	3[b]
Manipulation of equipment	7	3[c]	0	0	1

[a]Includes items from M1 Functioning, Hour 4 of Map Reading, Mines and Booby Traps, Squad Tactics, and Defense Against Air and Armor.
[b]Significant beyond .05 level.
[c]Significant beyond .01 level.

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